Enzo Peres Afonso

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Research Interests

Observational Astronomy, Robotic Telescope Networks, Transient Science (XRBs, CVs), and the application of Machine Learning to astronomical data.

Education

University of Cape Town *BSc in Astrophysics & Physics* *2022 – 2025*
Focus: Observational Astronomy, Stellar & Galactic Astrophysics, Experimental Physics

Research Experience & Internships

ROTSE-IIIc Telescope Restoration Project *Jan 2024 – Present*
South African Astronomical Observatory (SAAO)

- Architected a modern Observatory Control System using the `pyobs` framework, successfully replacing the defunct 20-year-old legacy `C` infrastructure.
- Developed asynchronous hardware interfaces to integrate modern and legacy systems.
- Engineered a cost-effective custom all-sky camera and environmental monitoring suite, integrating real-time telemetry into the telescope's autonomous decision-making logic.

PyObs Observatory Control System (Open-Source) *Jun 2024 – Present*
Remote / Institute for Astrophysics, Göttingen — Supervisor: Dr. T. Husser

- Contributing to the ongoing development within the `pyobs` Python framework.
- Architected a high-performance `C/Python` wrapper for Andor sCMOS hardware to enable low-latency imaging for transient astronomy.
- Awarded an SAAO research grant for a month-long residency in Göttingen (2024) to collaborate with the core development team.

South African Astronomical Observatory Intelligent Observatory Program (Intern) *Jan 2024 – Present*
Cape Town, South Africa — Supervisor: Dr. Nicolas Erasmus

- Deployed a machine learning computer vision pipeline to automate real-time cloud detection from all-sky cameras.
- Automated the Lesedi 1-metre telescope's daily flat-field and spectrophotometric target scheduling, significantly reducing the need for manual operator intervention during observing "pre-flight" routines.
- Support IO members across multiple observatory projects, developing python solutions for data-processing pipelines, ML model prototyping, automated testing frameworks and code documentation as well as hardware solutions.

Select Publications & Proceedings

- **Afonso, E. P.**, et al. "Refurbishing the ROTSE-III Facility in Namibia: A First Step for the African Integrated Observation System" *Proceedings of the AstroRob Conference 2025* (In Prep).
- **Afonso, E. P.** "AstroTouch: Tactile 3D Modeling of Astronomical FITS Data for Visual Impairment Inclusivity." (Open Source Documentation).

Technical Skills

Programming: Python, C/C++, Bash, Git, SQL, HTML & CSS

Data Analysis: FITS reduction, PSF photometry, ML (TensorFlow/PyTorch for Computer Vision), Source Extraction

Instrumentation: CAD (Fusion 360), Embedded Systems & PCB Design

Outreach & Volunteer Experience

Co-founder of **Zulelinye Outreach**, providing STEM mentorship to underserved communities. Developed **AstroTouch**, an open-source tool converting FITS data into 3D-printable tactile models. Recipient of a **National Bravery Award (2024)** for service as a volunteer surf-rescue lifeguard and helicopter rescue swimmer with Lifesaving South Africa.

References

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